

## ***LumiSolarCell System: Photo- & Electroluminescence Inspection Equipment for Wafers and Solar Cells***

The award-winning<sup>1)</sup> LumiSolarCell system utilizes the photoluminescence or alternatively the electroluminescence phenomena to image micro cracks, cell failures and inhomogenities of photovoltaic cells which are extremely difficult to detect visually. The equipment allows performing detailed quality control of single cells and wafers. It was developed for research and off-line industrial inspection.



LumiSolarCell System

The system consists mainly of a highly sensitive CCD-Camera and an innovative HighPower LED light source, developed and manufactured by greateyes. The compact system is delivered with a light-tight enclosure. A computer system is available as an option.

1) The LumiSolarCell system has been conferred with the Innovation Award of Berlin-Brandenburg 2010.

**Imaging Solutions**  
**Optical Sensing**

**phone:**

+49 30 6392 6237

**fax:**

+49 30 6392 6238

**internet:**

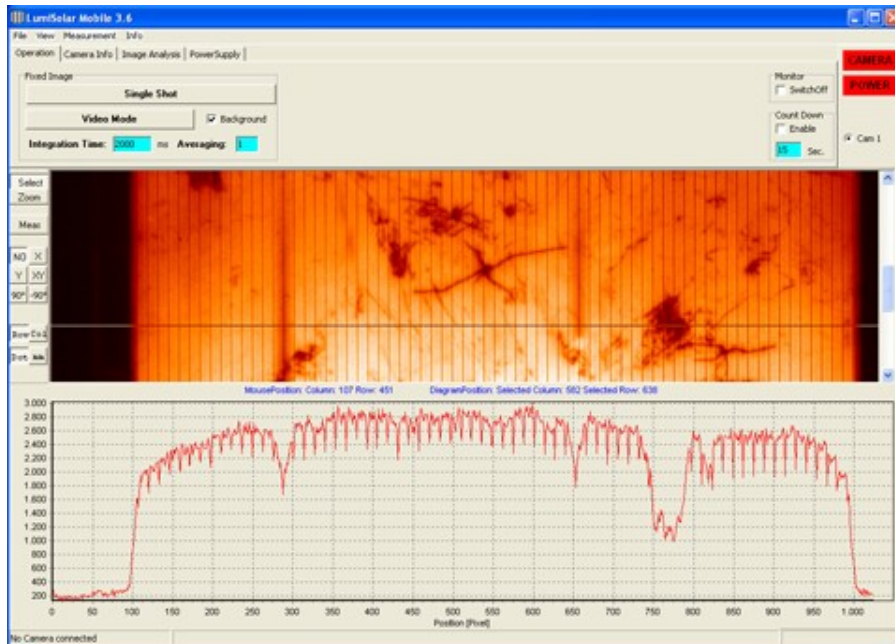
[www.greateyes.de](http://www.greateyes.de)

**email to:**

• [ |æ@!æ • &ā } &^.& {

## Software Overview:

The LumiSolarMobile software controls the camera and visualizes the data sets. Intensity profiles of the 16bit high dynamic range image data can be displayed in addition to basic picture manipulation procedures. Moreover dimension measurements of artefacts are possible following calibration.



LumiSolarMobile Software

## Software Functions:

- Save, Quicksave, Load Images
- Supported File Formats: BMP, JPEG, TXT and Raw data
- Single Image Mode, Video Mode
- Automatic Background Subtraction
- False-Color-Representation of Images
- Intensity slices in x, y direction
- Linear /logarithmic Scaling
- Zoom functions / Image Viewer
- Remote Control of Power Supply

## Software / Hardware Requirements:

- PC with WinXP or Windows Vista
- USB2.0 Interface

Imaging Solutions  
Optical Sensing

phone:

+49 30 6392 6237

fax:

+49 30 6392 6238

internet:

[www.greateyes.de](http://www.greateyes.de)

email to:

[solar@rayscience.com](mailto:solar@rayscience.com)

## Key features of the camera (GE 1024 1024 BI MID/NIR):



- Back-illuminated scientific CCD-Sensor
- High sensitivity in the near infrared region (85% @ 750nm, 40% @ 900nm, 12% @ 1000nm)
- Large pixel size of 13µm x 13 µm
- Resolution: 1024 x 1024 Pixel
- High dynamic range of image data (16bit or 65536 grayscales)
- Hermetically sealed vacuum chamber
- Peltier cooling down to -20°C
- USB 2.0 Interface
- Additional Driver for Labview are available on request

Imaging Solutions  
Optical Sensing

**phone:**

+49 30 6392 6237

**fax:**

+49 30 6392 6238

**internet:**

[www.greateyes.de](http://www.greateyes.de)

**email to:**

[info@greateyes.de](mailto:info@greateyes.de)

## Inspection capabilities:

- Shunt detection
- Micro cracks identification
- Cell print defects
- Solar cell rear side paste defects
- Detect Inhomogenities , Impurities
- Solar cell / Module efficiency classification

## Areas of application:

- Inspection of Wafers & Solar cells
- Identification/ Replacement of defect cells
- Improvement of general production efficiency
- Research and Development
- Characterization and Qualification

## Successfully tested on various solar cell / module types:

- |   |             |
|---|-------------|
| • Monocrystalline Silicon (mono-Si)     | – EL and PL |
| • Polycrystalline Silicon (poly-Si)     | – EL and PL |
| • Amorphous Silicon (a-Si)              | – EL        |
| • Copper Indium Sulfide (CIS)           | – EL        |
| • Copper Indium Gallium selenide (CIGS) | – EL        |

## General specifications:

### System components:

- USB 2.0 CCD-Camera : GE 1024 x 1024 BI
- Objective with enhanced NIR transmission
- HighPower LED Light Source (for PL Measurements)
- Cell Contact Probe (for EL Measurements)
- LumiSolarMobile software
- Synchronization Module for automated image capture
- Power supply and connection cables inclusive
- Complete dark chamber

### Power Supply:

- Standard ~230V, 50/60 Hz

### Dimension, Weight:

- Size of the case: 1200mm x 450mm x 450mm
- Total Weight: 30kg

**Imaging Solutions**  
**Optical Sensing**

### phone:

+49 30 6392 6237

### fax:

+49 30 6392 6238

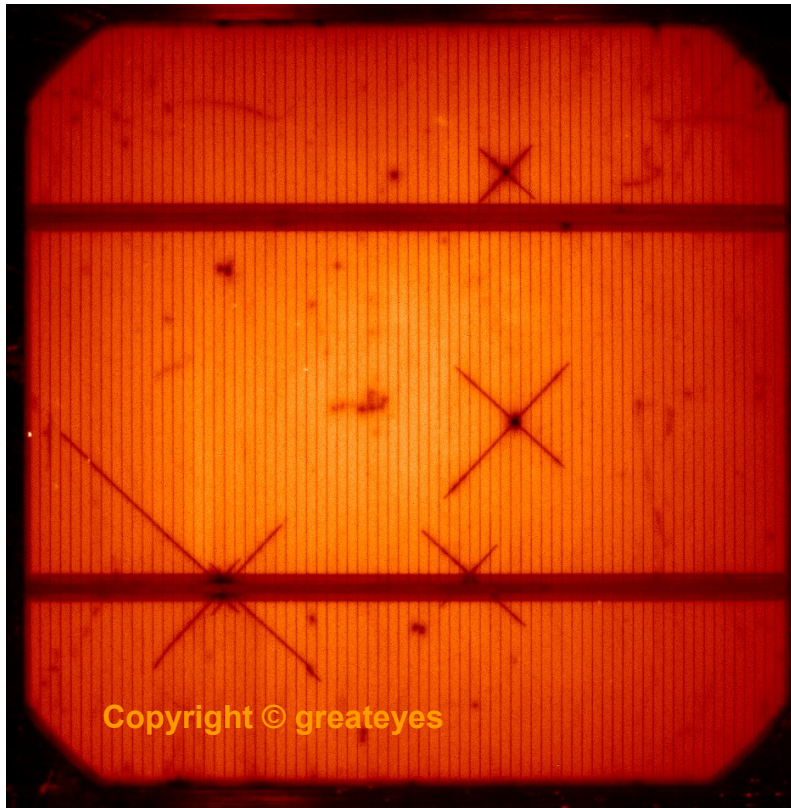
### internet:

[www.greateyes.de](http://www.greateyes.de)

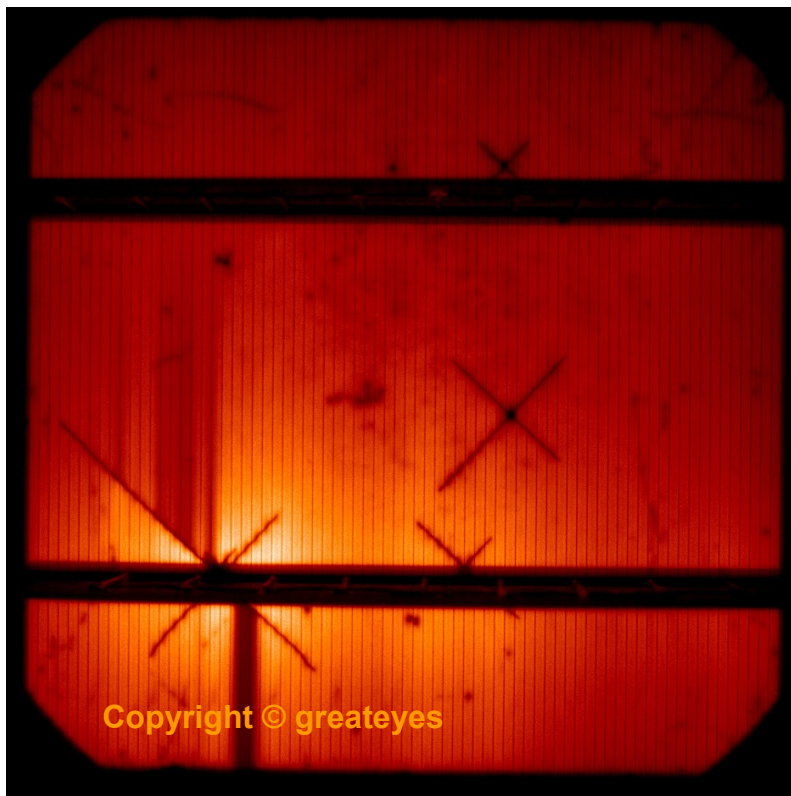
### email to:

[info@greateyes.de](mailto:info@greateyes.de)

**Photoluminescence:**



**Electroluminescence:**



**Imaging Solutions  
Optical Sensing**

**phone:**

+49 30 6392 6237

**fax:**

+49 30 6392 6238

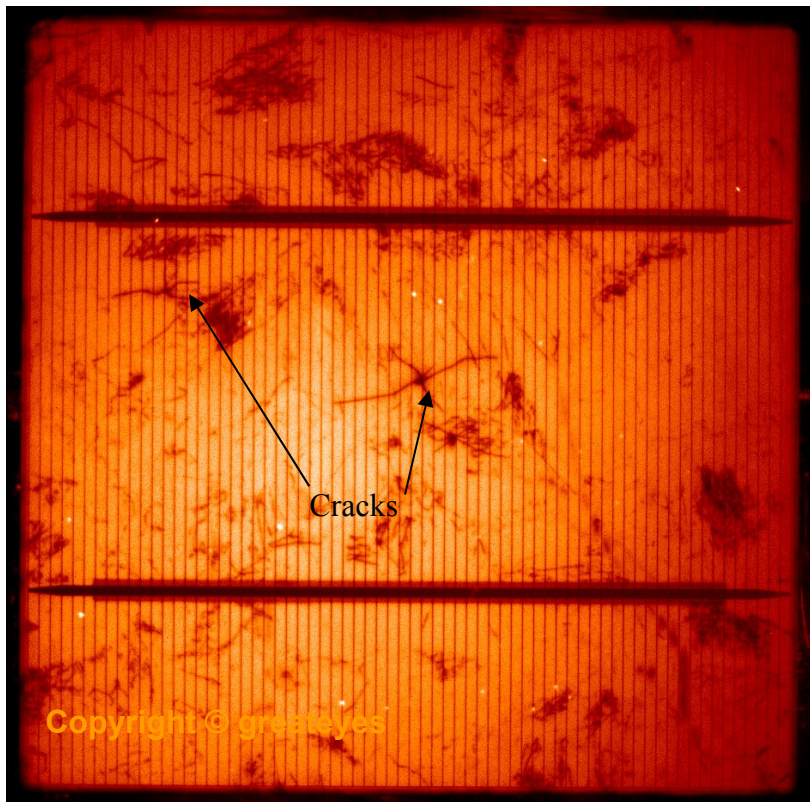
**internet:**

[www.greateyes.de](http://www.greateyes.de)

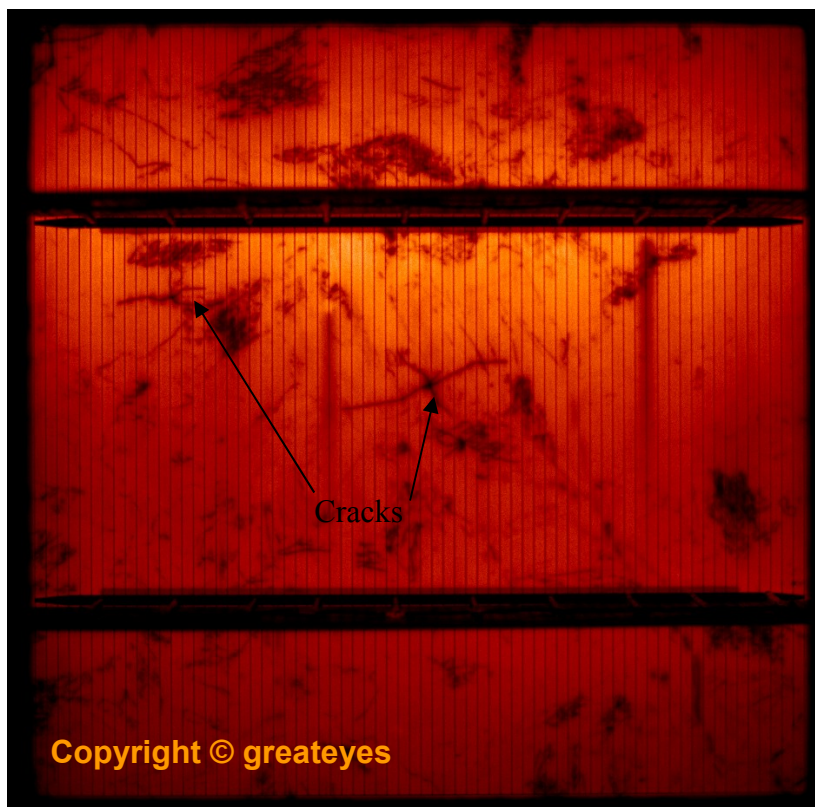
**email to:**

[info@greateyes.de](mailto:info@greateyes.de)

**Photoluminescence:**



**Electroluminescence:**



**Imaging Solutions  
Optical Sensing**

**phone:**

+49 30 6392 6237

**fax:**

+49 30 6392 6238

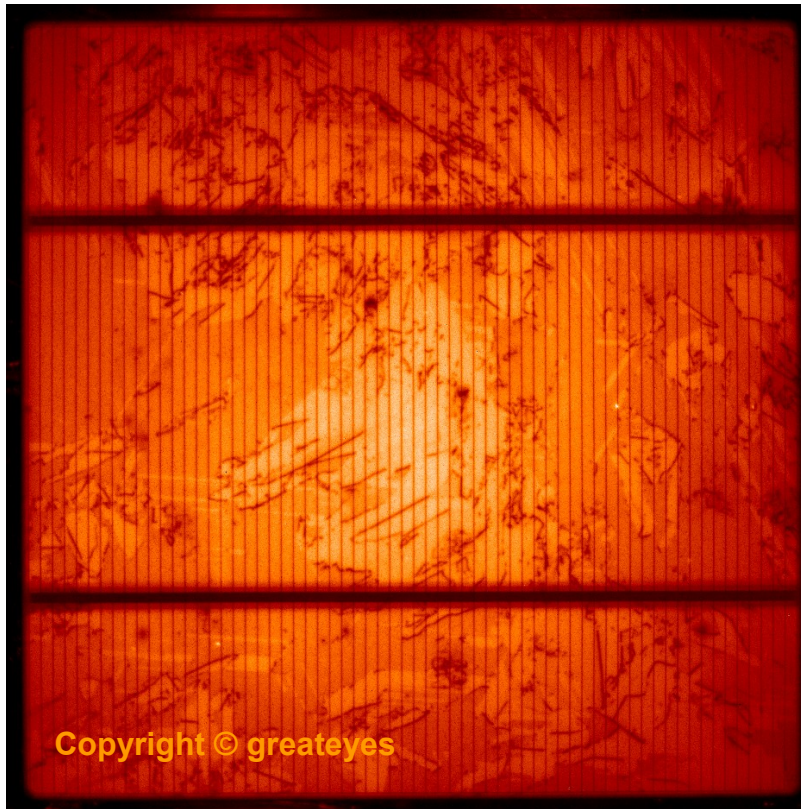
**internet:**

[www.greateyes.de](http://www.greateyes.de)

**email to:**

[info@greateyes.de](mailto:info@greateyes.de)

**Photoluminescence:**



**Imaging Solutions  
Optical Sensing**

**phone:**

+49 30 6392 6237

**fax:**

+49 30 6392 6238

**internet:**

[www.greateyes.de](http://www.greateyes.de)

**email to:**

[info@greateyes.de](mailto:info@greateyes.de)

**Electroluminescence:**

